IV. *An Abſtract of the Rev. Mr.* Gould's *Account of* Engliſh Ants; *in a Letter from the Rev.* Henry Miles, *D.D. and F.R.S. to Mr.* Henry Baker, *F.R.S.*

Read Jan. 15. 1746-7. I HERE ſend you a ſhort Abſtract of an ingenious Treatiſe on *Engliſh* Ants, the Peruſal of which has entertained and inſtructed me not a little; and as the very induſtrious Author has made more Obſervations than any other Perſon amongſt us appears to have done, and has diſcover'd ſeveral curious Particulars not mention'd by other Writers on the Subject, I thought you would not be diſpleaſed to ſee a brief Account of the Performance, with a few Remarks and Emendations I have taken the Liberty to make.

The Book is intituled, "*An Account of* Engliſh *Ants*;" which contains, 1. Their different Species and Mechaniſm; 2. Their Manner of Government, and a Deſcription of their ſeveral Queens: 3. The Production of their Eggs, and Proceſs of the Young: 4. The inceſſant Labours of the Workers, or common Ants; with many other Curioſities obſervable in theſe ſurpriſing Inſects: By the Rev. *Wm. Gould, A. M.* of *Exeter-College, Oxon. London:* Printed for *A. Millar*, oppoſite *Katherine-Street* in the *Strand*, MDCCXLVII. in large 12*mo.*

CHAP. I. Contains a Deſcription of Ants in general, their various Sorts, Colour, and Structure of their Parts.

Five Species of Ants have occurred to the Obſervation of our Author. 1. The Hill Ant, vulgarly called the Horſe-Ant. 2. The Jet Ant. 3. The red Ant. 4. The common yellow Ant. 5. The ſmall black Ant.

Having deſcribed the Size and Colour of theſe, he proceeds to deſcribe the Structure and nice Mechaniſm of Ants with great Accuracy; obſerving, that, beſides the *Viſcera*, there is in the Body of Ants a Bag of corroding ſpirituous Liquor, which they can eject to a conſiderable Diſtance at Pleaſure. This Particular has alſo been obſerved by other Writers.

He ſays, he has met with a Ligament in the red Ant, which uniteth the Breaſt and Body, conſiſting of two Lobes ſomewhat round; but in other Ants there appears but one Lobe, which riſes higher, and is broader, than the Lobes in the red. It is this Species of red Ants, which he has obſerved to have a Sting, of the ſame Contexture with that of a Bee, in Miniature: In other Ants he has met with no Sting; but they bite, or make a ſmall Inciſion, with their Saws, ejecting ſome of the afore-mention'd corroding Liquor, *&c.* The red Ants, which are furniſhed with a Sting, he obſerves live more open, *&c.* and are more bold than any of the others; and therefore ſuch a Weapon is ſerviceable to them.

The Jet-Ants, he informs us, have a peculiar diſagreeable Smell, which he imagines may be a great Preſervative to them againſt an Enemy; —— and that the Spirit which all Ants eject is very ſtrong, affecting at a ſmall Diſtance in the ſame manner as Spirits of Hartshorn.

CHAP.

CHAP. II. Treats of their Colonies, Cells, *&c.*

Here our Author obſerves, that tho' they unite in Colonies, in ſuch Places and Situations as are moſt agreeable to their different Natures, *&c.* yet their Reſidence is not ſo limited as to admit no Variation; however 'tis worth obſerving, that the ſeveral Species never ſo intermix, as to aſſociate and breed together, tho' they will live near and good Neighbours one to another.

Their Architecture, he ſays, is adjuſted with remarkable Curioſity and Art, the whole Structure being divided into a Number and Variety of Cells, communicating all of them with one another by little ſubterraneous Chanels, which are circular and ſmooth; but as for the Incruſtation, moſt *Virtuoſi* have mention'd, in the Apartments of Ants, our ingenious Author obſerves, that after the moſt careful Obſervation he could never find any Compoſition in their Structures; the Cells being formed in the Mold itſelf, without any Addition of Glew, Straws, *&c.* He acknowleges it may be otherwiſe in hotter Climates, where Sand is more apt to crumble.

Their Works, as he informs us, are all carried on by the Aſſiſtance of their double Saws, and the Hooks which are placed at the Extremity of them, deſcribed by him in the preceding Chapter. The Proceſs and Manner of their Work may eaſily be obſerved, he ſays, if you depoſit ſome Ants, with a Lump of moiſt Earth under a Glaſs.

CHAP. III. Treats of their Government; deſcribes their ſeveral Queens; the Reſpect ſhewn them by the common Ants, *&c.*

A Colony, our Author tells us, from the latter End of *Auguſt* to the Beginning of *June*, is uſually compoſed of a large Female, and various Companies of Workers. ——And beſides theſe, in the latter End of *June*, all *July*, and Part of *Auguſt*, of a Number of winged Ants commonly known by the Name of Ant-Flies. The Government, he ſays, has been univerſally taken for a Republic or Commonwealth; and have been treated as a Body conſiſting of Males and Females; the former being looked upon to be thoſe which make their Appearance with Wings in the Summer. But as, in the Oeconomy of Bees, the Generality of them have no Diſtinction of Sex, but make it their whole Employment to provide for the Young laid them by their Queen, ſo the ſame Character is found to be maintained in the Conſtitution of Ants. The common Ants therefore, which uſually preſent themſelves to our View, are, he ſays, like the common Bees, of neither Sex, but ſeem intirely deſtined to take care of, and educate the Young, which the Queen depoſits in the Cells.

In every perfect Colony, our Author ſays, there is at leaſt one Queen; who, in the Space of 7 or 8 Months, gives Birth to a Family, amounting, at a moderate Computation, to 4 or 5000; except the red Queens, who are not ſo prolific. The yellow Ants being the moſt frequent, he gives a very particular and curious Deſcription of their Queen; which, he tells us, is perhaps 5 times larger than any of her Subjects; and that, moreover, in her Front ſhe has three Eyes, in a triangular Form, which are leſs than the two common ones on each Side her Head. I omit other Particulars, as alſo his Deſcription of the other

Queens,

Queens, for Brevity's ſake.---- The Queen of the Jets, he ſays, he never had the Pleaſure of ſeeing.

He has beautifully repreſented the Obedience and Reſpect the Queen commands, in whatever Apartment ſhe condeſcends to be preſent.---An univerſal Gladneſs, he ſays, ſpreads itſelf thro' the whole Cell, expreſſed by particular Acts of Joy and Exultation: They have a particular Way, it ſeems, of skipping, leaping, and ſtanding upon their hind Legs, and prancing with the others; which Frolicks they make uſe of both to congratulate each other when they meet, and to ſhew their Regard for the Queen. Some walk gently over her, others dance around her, and all endeavour to exert their Loyalty and Affection. However romantic, ſays our Author, this Deſcription may ſeem, it may eaſily be proved, by placing a Queen, with her Retinue, under a Glaſs; for, in a few Moments, you will be convinced of the Honour they pay, and Eſteem they have for her.

In *October*, he tells us, Ants and their Queens begin to retire downwards; and, in the Depth of Winter, are to be found in the remoteſt Apartments, incircled cloſe with a Cluſter of Attendants, and, as it were, benumb'd.

CHAP. IV. The Author gives a particular Account of the Time and Manner in which the Queens lay the Eggs, *&c.*

And he ſays, he has been the more circumſtantial in this Point, to remove a Miſtake of Sir *Edmond King*'s, who, not aware of there being a ſuperior Female, gave into the old Opinion, that the

the ſmall Ants were the Females, and ſupplied the Colony with Young: After a juſt Deſcription of the Sperm or Eggs, Sir *Edmond* obſerves, that he found that Subſtance among the common Ants; and that he gave the more Credit to that Opinion, becauſe of the great Care and Tenderneſs with which they treat it.---But our Author does not allow this Reaſon to be concluſive, inaſmuch as the ſame is to be met with in the Conſtitution of Bees; adding, That having at all Times of the Year obſerved the common Ants, he could never diſcern any Alteration in their Bodies but what was occaſion'd by Food, or ſome Accident.

The Queen, he ſays, lays three different Sorts of Eggs, Male, Female, and Neutral: The two firſt in the Spring; the laſt in *July*, and Part of *Auguſt*.

CHAP. V. Our Author treats of the Change of the Eggs to Vermicles, *&c.* and gives us an Account of their ſurpriſing Continuance in that State.

The Queen having furniſhed the Eggs, he ſays, the common Ants brood over them in little Cluſters, perhaps by way of Incubation; and remove them to different Parts of the Colony, for the better Advantage of Moiſture, and a juſt Degree of Heat and Cold. The Time of Continuance in the Egg-State is ſomewhat uncertain: But he ſays they ſeem to diſengage themſelves from the Membranes that incloſe the Eggs in the ſame Manner as Silk-worms do.

The Proceſs of Ant-Vermicles, he tells us, is remarkable, and worth Obſervation. The Female Eggs put on the Form of Worms ſome time in *February*, at fartheſt; the Male by the latter End of *March*;

March; the Neutral by *September*. The firſt Summer they grow very ſparingly; the ſucceeding Winter they ſeem at a Stand: In the Beginning of *April* of the ſecond Year they viſibly augment every Day; and in ſix Weeks, or by the End of *May*, the Male and Female attain their greateſt Proportions, and are ready for another Change. This long Continuance of Ants in a vermicular State he thinks a great Curioſity, hardly to be met with in any other Claſs of Inſects---- the Female Ant continuing above a Year and Quarter, the Workers a Twelvemonth, the Males ſomewhat more.

CHAP. VI. Treats of a Tranſmutation of Ant-Vermicles to Nymphs or *Aurelia's*, *&c.*

The Vermicles, he ſays, weave in the Manner of Silk-worms, and in a few Days infold themſelves in a ſoft ſilken kind of Tiſſue: They henceforth aſſume, and, whilſt confined in this Monument, continue the Character of *Aurelia's*. Theſe are the ſmall Bodies which abound in the Settlements in the Summer-Months, and are vulgarly reputed Ant-Eggs; but their Largeneſs, and viſible Tranſmutation (as he juſtly obſerves), ſhew the Miſtake.

Our Author takes notice of a remarkable Variation in the *Aurelia's* of the red Ants. When the Worms arrive at their Period of Tranſmutation, he ſays, they do not infold themſelves in a Tiſſue or Shell, like the others, but lie motionleſs, and, to outward Appearance, inſenſible; in a few Days look whiter than ordinary, and in this manner gradually put on the Form of Ants. Thus Providence (remarks our Author) is tied down

to

to no particular Laws; but can, by a ſurpriſing Variety, accompliſh the ſame Ends.

In the VIIth *Chap.* he proceeds to treat of the Transformation of the ſeveral *Aurelia's* to Flies and common Ants, with a Deſcription of their Structure, Duration, and other Curioſities relating to the Change. But the juſt Progreſs of Ants-Eggs, Vermicles, Nymphs, *&c.* cannot, he ſays, be preciſely ſtated; becauſe they will not arrive at Maturity under Glaſſes, as *Swammerdam*, before him, had obſerved.

As ſoon as the Ant-Nymphs, ſurrounded with a Tiſſue, are tending to Life, he ſays, the Workers give them Air, by an Aperture in the Head-Part of the Covering; which Aperture they gradually enlarge; and, after a Day or two, take out the Young, and expoſe it to the freer Acceſs of the Sun-beams, which are of great Force in promoting its Maturity.

Our Author obſerves, that Philoſophers have uſually confounded the two different Sorts of Ant-Flies, the large and ſmall, looking upon them all under the Character of Males; tho' there be ſo wide and manifeſt a Variance in the Colour, Size, *&c.* that the naked Eye may eaſily diſtinguiſh it. —On the contrary, therefore, he preſumes they are of different Sexes: The ſmall ones he takes to be Males, and the large Females; and thinks it highly probable, that ſome of theſe Females, afterwards, give Birth to new Colonies, and intitle themſelves to the Dignity of Queens; there being, as he ſays, many ſtrong Experimental Reaſons to ſupport ſo uncommon a Curioſity; which he alſo recites, and anſwers the chief Objection againſt it, taken from the Number of theſe Ant-Flies: The principal Thing of which his Anſwer conſiſts

conſiſts is, that the moſt obvious Uſe of them is for the Suſtenance of other Animals.

In the Cloſe of this Chapter he annexes a few remarkable Curioſities reſulting from the Change. ---- The caſting of their Wings is an Inſtance, he ſays, peculiar to the large Ant-Flies; theſe being to other Inſects their higheſt Decorations; and the Want of them leſſens their Beauty, and ſhortens their Lives. On the reverſe, a large Ant Fly gains by the Loſs, and is afterwards promoted to a Throne, and drops thoſe external Ornaments, as Emblems of too much Levity for a Sovereign.

CHAP. VIII. Our Author here treats of the inceſſant Labours of the Workers, the true Method of collecting their Proviſions, and inquires into the Truth of the Opinion of laying up Corn, *&c.* againſt Winter, *&c.*

He ſays, The general Subject of this Chapter has been ſo largely treated of, and well illuſtrated, by ſome of the happieſt Favourites of *Minerva* and *Apollo*, that it is impoſſible to ſet it off with more Beauty of Thought, or Elegance of Stile; but perhaps, (ſays he) in many Circumſtances they have rather ſhewn the Poet than the Philoſopher; and rather indulged an extenſive Fancy, than Strictneſs of Inquiry.

I muſt here omit the Account the Author gives of the Labour and Induſtry of the common Ants, which is certainly very curious, that I may avoid being tedious; obſerving only, in general, that the Feeding the Young is the moſt laborious Exerciſe be-

longing to the working Ants, and a Part of their Induſtry the moſt uninterrupted of any.

The Juices of moſt Sorts of Fruit, Inſects, and Honey, or any other delicious Liquid, he ſays, are the Repaſt which they nurture them with. Theſe Juices they extract, and firſt convey into their own *Alvus*, and afterwards infuſe into the Bodies of the Vermicles; which Aliment, he ſuppoſes, may probably undergo ſome Refinement in the Repoſitories of the Ants, and, being there meliorated, is properly tempered for the delicate Structure of the Worms.

It has been a Diſpute, ſays our Author, amongſt the Inquiſitive on this Subject, whether Ants have Magazines of Corn, and lay up a Stock of Proviſions againſt Winter. The Generality of Writers, he ſays, hold the Affirmative; referring, in his Margin, to *Solomon, Pliny, Virgil, Horace, Aldrovand, Swammerdam, &c.* Here I am obliged to do Juſtice to *Swammerdam*; who, in his *Biblia Naturæ*, expreſly ſays, that he never at any time obſerved them to get together any Food againſt Winter; and is of Opinion, that, during the Severity of the Winter, they eat nothing; as is common with many Inſects, and ſome Species of Bees. His own Words, in *Vol.* I. *p.* 296. are as follow: *Neque etiam unquam obſervavi, quod cibaria quædam in hyemem ſibi comparent: unde cenſeo ipſas, quouſque vehementiſſima eſt hyems, nihil comedere; quemadmodum multis inſectis, et apum quoque nonnullis ſpeciebus, familiare eſt; quæ tempore brumali ab omni penitus cibo abſtinent.*

Our Author, with great Deference to the Writers who have held the Affirmative, and with extreme Decency, differs from them, offering a handſome

Apology

Apology for himſelf. --- He ſuggeſts, that in warmer Regions they may not undergo the Chill they do with us; and therefore may not paſs the Winter in a State of Numbneſs.---- That, if this be the Caſe, a Store of Food muſt be neceſſary to them, which is not to our Northern Ants, which live, as it were, entranced. He adds, that, upon the moſt impartial Examination of Authors, the Opinion ſeems rather to be ſupported by its Antiquity, than reduced to a clear Demonſtration.---He tells us, that, as upon the moſt exact and frequent Examination of numerous Settlements, in the Winter, he could never trace out any Reſervoirs of Corn, or other Aliment; no, not in thoſe of the Hill-Ants, which are the largeſt, and proportionably ſtrong: So, to put this Matter beyond all reaſonable Doubt, he had recourſe to Experiments; which, had the Suppoſition been true, could not probably fail of ſucceeding. At the Beginning of the Spring, he placed, in ſeveral Flower pots, and other Conveniencies, different Colonies of yellow ſmall black Ants, *&c.* with their reſpective Queens, Attendants, and Vermicles; in which Poſition they continued Summer, Autumn, and Winter, and carried on their Operations as in other Settlements, nouriſhed their Young, and brought them to Perfection: From whence he concludes, that they would have laid up Proviſions, had it been their Cuſtom; but, upon carefully examining ſome of theſe Pots, he found no Appearance of Magazines of Corn, or any collected Food: And that, upon his having frequently obſerved their Excurſions from, and Return to their Colonies, he could never find, that they ever return'd with any Wheat, Corn, or any other

vegetable Seed; tho' they would with Eagerneſs attack a Pot of Honey, or a Jar of Sweetmeats, *&c.* Many other Experiments, beſides theſe, our Author made, which I forbear to give you, judging theſe to be ſatisfactory.

The moſt material Argument in Favour of Ant-Magazines, he thinks, is the Authority of the Sacred Writings.---- *Solomon,* he ſays, has twice mention'd theſe extraordinary Inſects; and each time with an immediate Reference to their Sagacity in providing for the Neceſſities of Winter. — For removing this Difficulty, he has recourſe to the former Solution.—— The ſuperior Warmth of the Climate he lived in, and, of conſequence, the proportionable Clemency of the Seaſons; whence he concludes the Ants of thoſe Countries may vary from ours in this, as well as in other Reſpects: Or perhaps, adds he, it might have been a received Opinion, as was the Sun's Motion; from whence this great Prince might recommend it, as a worthy Example of Induſtry and Wiſdom.

If I might have Leave humbly to offer my Opinion, our Author ſeems to have juſtified his Conduct in departing from the commonly received Opinion: And perhaps there is good Reaſon to think that it has been handed down from ancient Writers of Reputation, and too eaſily received, without carefully examining into the Truth of the Fact; which Perſons might eaſily be led to do from a general Obſervation of the extraordinary Induſtry of theſe little laborious Animals in carrying Things into their Cells.

The moſt learned *Bochart,* in his *Hierozoïcon,* has diſplay'd his vaſt Reading on this Subject, as he uſually

uſually does on all others; and has cited Paſſages from *Pliny*, *Lucian*, *Ælian*, *Zoroaſter*, *Origen*, *Baſil*, and *Epiphanius*, *Jewiſh Rabbi's*, and *Arabians*, all concurring in the Opinion, that Ants cut off the Heads of Grain, to prevent their germinating: But he confeſſes, that the ancienter *Greek* Writers have made no ſuch Obſervation of the Ants; nor any of them who lived before *Pliny*, as far as he remembers. Very probably this Opinion aroſe from what might have been obſerved of theſe laborious Inſects, in cutting aſunder with their Saws ſuch Grains of Corn, or other Matters, which they might have Occaſion to carry to their Neſts, but were too bulky; for that they cut off Graſs, and other Things, which they find in the Road to and from their Repoſitories, our Anthor has obſerved: And it is obſervable, that the *Hebrew* Name of the Ant נמלה *Nemala*, from the Verb נמל, *Namal*, which ſignifies to cut off, is uſed for cutting off Ears of Corn (*Job*, xxiv. ver. 24.*)

But if we conſider the two Texts, in the Book of *Proverbs*, cited by our Author, there is not the leaſt Intimation in them of their laying up Corn in Store *againſt Winter*. In *chap.* vi. *ver.* 8. it is ſaid, *She provideth her meat in the ſummer, and gathereth her food in the harveſt:* For, tho' the former Verb הכין *Hekin* ſignifies to prepare, or diſpoſe in Order, and the latter אגר, *Agar* to collect, or gather together;

* I might alſo have referred to the *Theatrum univerſale omnium Animalium* of *Jonſton*, publiſh'd by Dr. *Ruyſch* junior of *Amſterdam*, in 2 Volumes *folio*, Vol. II. p. 85.

together; and in the only two Places where I find it occur beſides, is uſed for Gathering in Summer, as *Prov.* x. 5. and for Gathering in the Vintage, *Deut.* xxviii. 39. yet the Expreſſions, in the Text, neceſſarily mean no more, than that they collect their Food in its proper Seaſon; —— nor is there any thing elſe declared *chap.* xxx. *ver.* 25. So that all which may fairly be concluded from Scripture is, that they carry Food for themſelves into their Repoſitories *. That they do this againſt *Winter* can only be determined by examining into the Fact: This our Author has done with very great Diligence, and has diſcovered, with reſpect to our *Engliſh* Ants, that they eat not at all in the Winter and have no Stores laid in of any ſort of Food. The Opinion therefore of their laying in Magazines againſt Winter, ſeems to me to have been grafted on theſe Scriptures, rather than found in them; and this from a Concluſion naturally enough made, from obſerving (as I ſaid) their wonderful Labour and Induſtry in gathering their Food in the Summer, —— ſuppoſing that this muſt be to provide againſt Winter. —— And, after all, great Part of their Labour, which may have been beſtowed in other Services, might eaſily be miſtaken, by leſs accurate Obſervers, for carrying in Food.

I am ſorry I muſt omit the ingenious Author's juſt moral Reflections; but my Time will only allow me to conclude, as he does, with the Words of the Royal Pſalmiſt, *Great is the Lord, and marvellous, worthy*

* *i. e.* To ſerve them as long as it will keep good, or they ſhall need it.

worthy to be praiſed, and there is no End of his Greatneſs. I am,

Dear Sir,

Tooting, Dec. 10. 1746.

Your moſt affectionate, and obliged humble Servant,

H. Miles.

V. *A Remark on Father* Hardouin's *Amendment of a Paſſage in* Pliny's Natural Hiſtory, *Lib.* II. § LXXIV. *Edit. Pariſ. folio*, 1723. *by* Martin Folkes, *Eſquire, Pr. R. S.*

Read Jan. 22. 1746-7.

VAſaque horoſcopa non ubique eadem ſunt uſui, in trecentis ſtadiis, aut ut longiſſime, in quingentis, mutantibus ſemet umbris ſolis. Itaque umbilici (quem gnomonem appellant) umbra in Ægypto meridiano tempore, æquinoctii die, paulo pluſquam dimidiam gnomonis menſuram efficit. In urbe Roma nona pars gnomonis deeſt umbræ. In oppido Ancone ſupereſt quinta. Decima in parte Italiæ, quæ Venetia appellatur, eiſdem horis umbra gnomoni par fit.

The geographical Reader cannot but obſerve here immediately, that ſomewhat is faulty in this Paſſage as it ſtands; ſince the equinoctial Shadow of the *Gnomon* being made ſhorter at *Ancona* than at *Rome*, the Latitude of *Ancona* will conſequently be made leſſer than that of *Rome*; whereas it is known to

be